

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

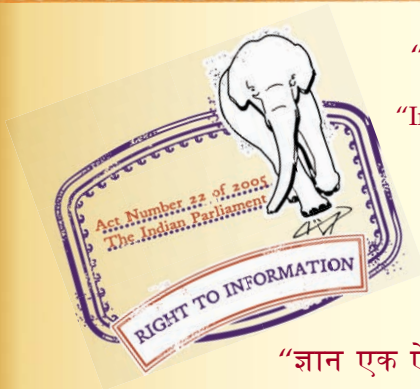
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 6937 (1986): Overhead projectors (first revision) [MED
32: Photographic Equipment]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 6937 - 1986

Indian Standard
SPECIFICATION FOR
OVERHEAD PROJECTORS
(First Revision)

UDC 681.775 : 778.27

© Copyright 1987

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR OVERHEAD PROJECTORS

(*First Revision*)

Cinematographic Equipment Sectional Committee, ETDC 47

Chairman

SHRI B. A. MISTRY
15, Parsee Panchayet Road,
Mistry Apartments, Bombay

Members

SHRI S. N. AGARWAL
SHRI S. P. AGARWAL (*Alternate*)
SHRI R. S. ARORA
SHRI D. L. TALWAR (*Alternate*)
SHRI S. C. BATRA

SHRI R. P. AGARWAL (*Alternate*)
SHRI N. P. BHATTACHARYA

SHRI BHUPAN GHOSH
SHRI MANNA LADIA (*Alternate*)
SHRI Y. R. CHAUHAN
SHRI R. S. CHAUHAN (*Alternate*)
SHRI B. C. MUKHERJEE
SHRI M. C. MANI
SHRI A. B. KUCHERIA (*Alternate*)
SHRI JAL P. MISTRY

SHRI DIPAK B. ADALJA (*Alternate*)
SHRI MOHANJEET SINGH

Representing

Cinecita Pvt Ltd, Bombay
Directorate General of Supplies & Disposals,
New Delhi

Directorate of Technical Development &
Production (Air), Ministry of Defence,
New Delhi

National Council of Educational Research &
Training, New Delhi
Cine Mechanical Works, Calcutta

Cine Sales Corporation, Delhi

National Test House, Calcutta
Photophone Pvt Ltd, Bombay

International Talkie Equipment Co Pvt Ltd,
Bombay

Directorate General of Technical Development,
New Delhi

(*Continued on page 2*)

© Copyright 1987

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

Members

SHRI N. NARAYANA RAO
SHRI D. R. DHIMAN (*Alternate*)
DR S. B. THAKUR
SHRI K. K. KOUL (*Alternate*)
SHRI K. RAJGOPAL CHETTY
SHRI K. M. GNENAPRAGASAM (*Alternate*)
SHRI RAM PRASAD
SHRI SATISH KUMAR
SHRI P. V. K. REDDI (*Alternate*)
DR S. P. SINGHAL
SHRI G. SINHA
SHRI A. R. MURALI (*Alternate*)
SHRI S. S. VOHRA
SHRI S. P. SACHDEV,
Director (Elec tech)

Representing

Ministry of Defence (DGI), New Delhi
Photophone Industries India Ltd, Goa
Devi Cine Projectors Manufacturing Co, Madras
National Physical Laboratory (Optics Division)
(CSIR), New Delhi
Film and T. V. Institute of India, Ministry of
Information and Broadcasting, Pune
National Physical Laboratory (Acoustic Division) (CSIR), New Delhi
Hindustan Photo Films Manufacturing Co,
Ootacamund
Films Division, Ministry of Information & Broad-
casting, Bombay
Director General, BIS (*Ex-officio Member*)

Secretary

SHRI B. K. MAHATA
Joint Director (Elec tech), BIS

Indian Standard

SPECIFICATION FOR OVERHEAD PROJECTORS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 13 November 1986, after the draft finalized by the Cinematographic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was first published in 1973. It has been revised to include certain methods of optical tests and some modifications in the requirements of projectors.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies general design and performance requirement of overhead projectors for rated voltage not exceeding 250 V.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions, in addition to those given in IS : 1885 (Part 34)-1972†, shall apply.

2.1 Overhead Projector — A projector which projects upon a screen behind the operator, a transparency, X-ray film or slide, when placed on a horizontal surface in front of the operator, in a room lighted with normal intensity.

NOTE — When the projectors are used for projecting X-ray films the room may have to be darkened.

*Rules for rounding off numerical values (revised).

†Electrotechnical vocabulary: Part 34 Cinematography.

3. DESIGN AND CONSTRUCTION

3.1 Projectors shall be portable. They shall be of sturdy construction, with precision mechanism and with such optical equipment that will give high grade picture-projection results and maximum of trouble-free service under usage. There shall be no objectionable keystoneing. Each projector of a specified size shall be assembled as a complete projector and shall be matched to associated parts electrically, mechanically and optically. The main frame for the projector shall be of metal and of sufficient strength to maintain accurate alignment of all moving parts and the optical system during the life of the projector. The projector base dimensions shall not exceed 350×550 mm, for Type 1 and Type 2 (see 4.1).

3.2 Lubrication — Lubrication, if necessary, shall be built into the system which will not require re-lubrication during the life of the projector. Self-lubricating bearings, or bearings requiring no lubrication, will be considered as satisfying this requirement.

3.3 Projector Feet — Front corners of the projector shall be provided with captive adjustable rubber feet to prevent sliding of the projector.

3.4 Facilities for Cleaning — The surfaces of component parts of the optical system, not sealed against the ingress of dust, shall be easily accessible for cleaning and the projector shall be so designed that if any of these components are removed that may be readily replaced only in their correct positions.

3.5 Adjustment During Use — Normal adjustment during use shall not involve the complete removal of screws or similar parts. The projector shall be provided with means of elevating the axis of beam and of adjusting this elevation according to the height of the screen.

3.6 Roll Mechanism — A plastic roll mechanism capable of covering the entire picture aperture shall be an integral (built-in) part of the projector. This attachment shall contain a positive drive and have sufficient friction to hold down the plastic film flat on the projector stage. A plastic roll 8 m in length shall be furnished with each projector as an accessory. The thickness of plastic roll shall be preferably $100 \mu\text{m}$ but not less than $75 \mu\text{m}$ in any case. The roll shall be transparent, clear and non-curling. The roll mechanism shall accommodate the thickest transparent roll which may be offered for use with overhead projectors.

4. TYPES

4.1 The different types of overhead projectors depending on the screen

lumen output shall be classified as follows:

	<i>Nominal Projection Area, mm</i>	<i>Screen Lumen Output, Min</i>
Type 1	250 × 250	900
Type 2	250 × 250	1 600
Type 3	325 × 400	2 200

NOTE — Type 3 projectors are intended for projecting X-ray films.

5. OPTICAL REQUIREMENTS

5.1 Distortion — The projected (straight ahead) image of straight lines forming the sides of a rectangle, placed centrally over the projecting stage, shall not deviate more than 1·5 percent of their length. The sides of the rectangle shall be within 25 mm of the edge of the projection area, for example, in a 250 × 250 mm projector, the rectangle shall measure 200 × 200 mm.

5.2 Uniformity of Illumination — The overhead projector shall be designed such that it satisfied the following conditions:

- There shall be no objectionable bands or patches of differing colour or brightness visible on the screen,
- The ratio of corner-to-centre illumination on the screen shall not be less than 0·40, and
- The average illumination at the four corners shall be not less than 40 percent of the value at centre.

5.3 Light Output — The light output of the overhead projector, when tested by the method given in 10.6, shall be as specified in 4.1.

5.4 Reflector — The spherical reflector behind the projection lamp shall be a glass optically ground and polished or a highly polished metal one.

5.5 Focusing Mechanism — An easily operable focusing mechanism shall be provided which will produce a clear steady focus of the projector image from projection distances of 1 to 4 m for Types 1 and 2 and 1 to 7 m for Type 3. The projection distance shall be measured from the centre of the objective head to the screen.

5.6 Reproduction — The images produced by the projector shall be free from haze, internal barrel reflections, and degradations due to surface or glass defects. The glare reaching the eyes of either operator or audience

shall be reduced to a practical minimum. The central region of the projected area shall be free of chromatic aberrations.

5.7 Resolving Power of the Lens — The value of the resolving power of the lens, when tested by the method given in **10.4**, shall be not less than;

- a) 6 lines per mm for Types 1 and 2, and 20 lines per mm for Type 3 at the centre; and
- b) 2 lines per mm at the corners.

6. ELECTRICAL AND SAFETY REQUIREMENTS

6.1 The equipment shall be so insulated and protected that there shall be no danger from electrical shock or fire, and provision shall be made for the efficient earthing of all metal parts likely to become live in the event of failure of any part of the insulation.

6.1.1 The earthing terminal shall be clearly and indelibly indicated by symbol.

6.2 The electrical circuits of the projector lamp and the ventilator motor, if any, shall be so interconnected that the projector lamp cannot be switched on unless the ventilator motor is energized. It shall not be possible to insert a lamp into a live socket.

6.3 Abnormal Operation — The projector shall be so designed that risk of fire, mechanical damage or electric shock as a result of abnormal or careless operation is obviated as far as possible.

Unless otherwise declared by the manufacturer, rated voltage shall be 230 ± 10 volts.

6.4 A light dimmer switch to vary the light output shall be provided. The dimmer circuit shall be an electronic voltage chopper circuit and will be controlled by a potentiometer. The circuit should also incorporate high voltage trip off when the voltage exceeds the maximum limit.

6.4.1 If an integral lamp changing device is fitted, power shall not be fed to the lamp unless it is in the correct operating position with respect to the optical system of the projector. The control used for the integral lamp changing device shall be clearly identified and not prone to inadvertent operation.

6.5 The projector shall be so designed that it shall have adequate stability.

7. MECHANICAL REQUIREMENTS

7.1 Protection Head Support — The projection head support shall be of rigid non-brittle metal having preferably such composition as to prevent corrosion or suitable plated or corroded to prevent wear and corrosion. Means shall be provided to centre the lens over the optical axis easily without obstructing the operator's view of the audience.

7.2 Ventilating Fan — A ventilating fan attached to the fan motor shaft shall be provided. The fan shall be capable of cooling and ventilating the lamp housing to meet the requirements of 7.3. The hot air blown from the lamp housing shall be directed away from the operator.

7.3 Temperature-Rise — The temperature-rise of external surfaces of the projector, except metal handles or metal hand grips and the underside shall not exceed 30°C above ambient temperature. The temperature-rise of metal handles or hand grips shall not exceed 20°C above ambient temperature. The temperature-rise for underside shall not exceed 40°C above ambient temperature.

7.3.1 Temperature-rise test shall be carried out as given in 10.8.

7.4 System Vibration — Vibration transmitted to the optical system from the ventilation unit of the projector shall not be of sufficient magnitude to effect visibly the projected image.

7.5 Elevating Device — Means shall be provided for raising the image from -5 to $+15$ degree above the horizontal. The adjustment shall be rapid and, once it is set, the position of the image shall remain fixed until changed by hand.

8. ATTACHMENTS AND ACCESSORIES

8.1 Subject to agreement between the purchaser and the supplier, the following attachments and accessories shall be furnished:

a) Accessories:

- 1) Carrying case;
- 2) Stands, high or low;
- 3) Clear plastic sheets mounted in frames;
- 4) Plastic roll; and
- 5) Film, ink, grease, pencils and backing sheets.

b) Attachments:

- 1) Slide attachment, and
- 2) Techistoscope adapter.

8.2 Requirements for Slide Attachment — It shall accommodate slide and transparencies of full picture aperture size and a metal plate which slide in groove sides of the slide attachment located above the slide to be projected. The metal plate shall be fitted with a suitable handle to facilitate withdrawing, in the event of a part of information contained on the slide transparency is desired to be shown at one time. To facilitate the removal and replacement of slides, the metal plate and grooved sides shall be capable of being raised through at least a 45° arc by use of hinges located on that part of the slide attachment normally closet to the operator. This attachment shall contain a positive drive and shall have sufficient friction to hold down the plastic film flat on the projection stage.

9. MARKING AND INFORMATION

9.1 The following information shall be clearly and indelibly marked:

- a) Name of the manufacturer or the supplier and trade-mark, if any;
- b) Type and serial number;
- c) Rated voltage, frequency and power input;
- d) Voltage and maximum wattage of the projection lamp to be used; and
- e) Country of manufacture.

9.1.1 Full information regarding operation, lamp replacement and maintenance, and all safety measures as deemed necessary during operation and maintenance of overhead projector shall be provided, in the form of accompanying documents.

9.1.2 The projectors may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986, and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufactures or producers, may be obtained from the Bureau of Indian Standards.

10. TESTS

10.1 Classification of Tests

10.1.1 Type Tests — The following shall constitute type tests:

- a) High voltage test (*see* 10.2),
- b) Insulation resistance test (*see* 10.3),
- c) Test for stability (*see* 10.7),
- d) Test for temperature-rise (*see* 10.8), and
- e) Test for light output (*see* 10.6).

10.1.2 Routine Tests — The following shall be carried out as routine tests:

- a) High voltage test (*see* 10.2),
- b) Insulation resistance test (*see* 10.3),
- c) Test for resolving power of lens (*see* 10.4), and
- d) Test for uniformity of illumination (*see* 10.5).

10.2 High Voltage Test — There shall be no flash-over or breakdown during the test when a projector is subjected to the following tests:

Remove the lamp and subject the insulation for one minute to an ac voltage of substantially sine-wave form, with any suitable frequency between 40 Hz and 60 Hz.

Apply the test voltage between the parts indicated in Table 1, the value of the voltage being as indicated in Table 1.

Initially apply not more than half the prescribed voltage, then raise it rapidly to the prescribed value.

Take care, when applying the metal foil, to see that adequate clearance is maintained between the foil and external metal parts in order to avoid overstressing the insulation between live parts and earthed metal parts, and when testing reinforced insulation to ensure that the protective insulation is not overstressed.

10.3 Insulation Resistance Test — The insulation resistance shall be not less than the following limits when tested according to 10.3.1:

For functional insulation	1 Megohm
For protective and reinforced insulation (including insulation with metal foil on the outer surface)	10 Megohms

TABLE 1 TEST VOLTAGE

(Clause 10.2)

Sl No.	POINTS OF APPLICATION OF TEST VOLTAGE	TEST VOLTAGE (V)
i)	Between live parts and metal parts that are separated from live parts by: functional insulation reinforced insulation	1 000 4 000
ii)	Between live parts and metal foil on accessible surfaces of insulating material if there is no intermediate metal or the test of Sl No. (iv) cannot be made	3 500
iii)	Between live parts of different polarity	1 000
iv)	For parts with double insulation, between metal which is separated from live parts by functional insulation only and live parts across functional insulation	1 000
v)	Accessible metal enclosure or metal foil in contact with accessible surfaces of insulation material across protective insulation	2 500
vi)	Between metal foil in contact with the surface of handles, knobs, grips and the like, and their shafts, if these shafts can become live in the event of an insulation fault	2 500
vii)	Between accessible metal parts in all insulated or double insulated construction and either metal foil wrapped round the supply flexible cord inside the inlet bushing, cord guards, cord anchorages and the like, or a metal rod of the same diameter as the cord, inserted in its place	2 500
viii)	Between the inner and outer surface of sleeves or the like used as protective insulation in all or double construction	2 500

10.3.1 Immediately after the voltage test, measure the insulation resistance as 500 V dc, the test voltage being obtained from an independent sources or generated in the measuring instrument. Carry on the test as follows:

- a) Between live parts and the following parts connected together:
 - 1) Accessible metal;
 - 2) Metal foil on external parts of insulating material; and
 - 3) Shafts of handles, knobs, grips and the like, if of metal and if the handles, etc, can be removed without tools.

- b) Between live parts of different polarity as far as the necessary disconnections can be made without damaging the projector.

10.4 Test for Resolving Power of Lens

10.4.1 Procedure — Use the projector under test to project an image of the standard resolution test slide described in 10.4.1.1, upon a matt white surface. Locate this surface at such a distance from the projector that the long dimension of the projected image will be one metre or more, in order that the observer will have no difficulty in distinguishing the number of lines resolved.

Ensure that the surface is perpendicular to the projection axis and that the lens is so focused that the test pattern at the centre of the test slide is projected as sharply as possible.

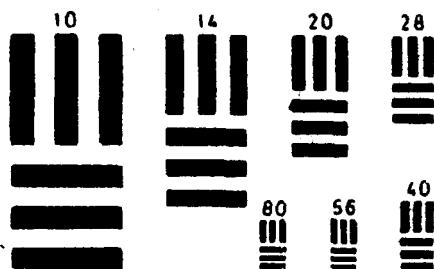
The width of line in the test pattern for 6 lines per mm and 2 lines per mm will be $\cdot 083$ mm and $\cdot 25$ mm respectively. The image on the screen magnified by 4 times will be $0\cdot 333$ mm and 1 mm. As the resolution of the normal eye (of the observer) is 1 minute, the normal distance to view clearly and separately the pattern of $\cdot 333$ and 1 mm thickness will be 1 and 3 m. Therefore, the viewing distance for centre point will be 3 m and for corner point will be 1 m.

Other method to find out the correct viewing distance is to fix the test patterns chart on the screen having width of line equal to projected image of test pattern. The image on the screen should be seen from the maximum distance at which the fixed test pattern is also clearly visible.

At each test point examine each group of lines in the test pattern consecutively to the limit of resolution commencing with the largest group in the test pattern taking radial and tangential directions together. The limit of resolution occurs in the group preceding that which contains two unresolvable lines, that is, lines not identifiable as separate lines or not running in correct direction, and the resolving power of the lens at this point is the number of lines per millimetre in the group containing the limit of resolution. If smaller groups reappear as distinguishable beyond the limit of resolution these smaller groups shall be disregarded.

10.4.1.1 Resolution test slide — The resolution test slide shall be a flat glass plate carrying test patterns in accordance with Fig. 1 and distributed over the aperture area in accordance with Fig. 2A or 2B. Identification of the test patterns by letter, A, B, C, etc, should be in accordance with Fig. 2A or 2B. The resolution test slide shall comply with the appropriate overall dimensions and thickness requirements given in Table 1 of IS : 5673-1970*.

*Methods of test for still projectors.



NOTE 1 — Figures indicate number of black lines per millimetre.

NOTE 2 — A group consists of one set of horizontal and vertical lines.

FIG. 1 LENS RESOLUTION TEST PATTERNS

The test pattern shown in Fig. 1 shall include at least 1, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.0, 6.3, 7.1, 8.0, 9.0 and 10 lines per mm. By 'x lines per mm' is meant dark parallel lines $1.5/x$ mm long and $0.5/x$ mm wide, separated by a light source $0.5/x$ mm wide.

The dark lines of the test pattern shall have a photographic density of at least 2.0 greater than the density of the background. For locating the corner points for resolution test, the dummy screen used for measurement of light intensity should be used.

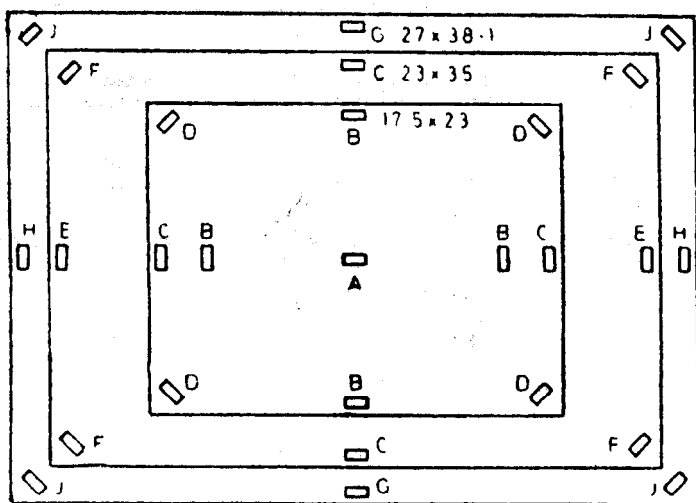
10.5 Test for Uniformity of Illumination

10.5.1 Procedure — The test shall be carried out with no other primary source of illumination than that of the projector.

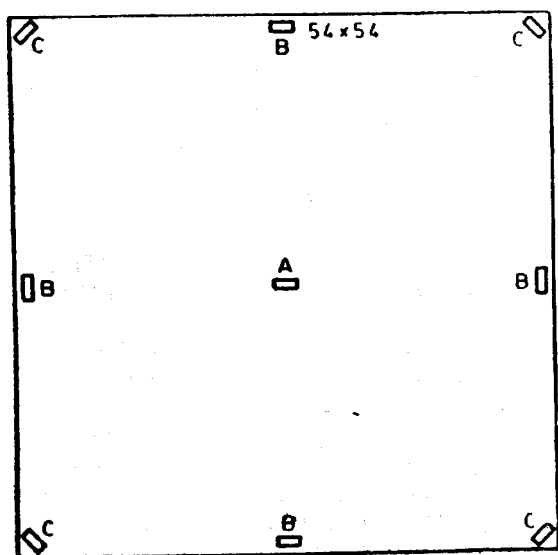
Immediately prior to the commencement of the test, the equipment shall be run for half an hour.

Focus an image of the aperture test slide on the surface of a screen with light measuring devices in the plane of the screen as shown in Fig. 3. Adjust the throw until the long dimension of the projected image of $1 \text{ m} \pm 5 \text{ mm}$. Minimize the effects of stray light so that they do not affect the validity of the test result.

Measure the illumination at the centre of the screen, and at each of four points, one in each corner of the screen and located at a distance equal to 10 percent of the long dimension of the projected image from



2A



2B

FIG. 2 RESOLVING POWER TEST CHARTS

the top or bottom edge, and the same distance from the side edges of the projected image (see Fig. 3).

NOTE — For testing of light output and uniformity of illumination, voltage of the mains supply used shall be adjusted with ± 5 percent of the rated voltage for the projector.

While adjusting the main supply, the voltage shall be measured at the supply socket to which the recommended power supply cord is connected.

Measurement for calculating light output and uniformity of illuminization shall be made with an incident light photometer without cosine correction but having its spectral response corrected to the sensitivity of a standard.

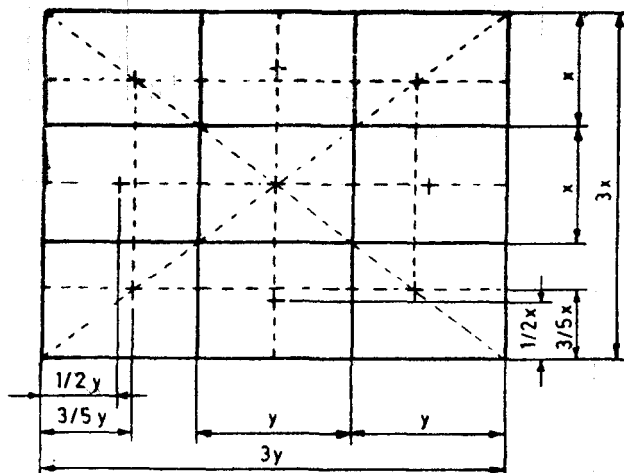


FIG. 3 DUMMY SCREEN FOR MEASUREMENT OF UNIFORMITY OF ILLUMINATING AND LIGHT INTENSITY

10.5.2 Result — Record the uniformity of illumination as the ratio of the corner to centre illumination at each corner. Record the aperture test slide used.

10.6 Test for Light Output — The light output shall be measured in accordance with 9 of IS : 5673-1970* except that the points at which the illumination shall be measured near the corners of the screen, shall be located as indicated in Fig. 3 (instead of Fig. 4 of IS : 5673-1970*) of this standard (see also note under 10.5).

*Methods of test for still projectors.

10.7 Test for Stability

10.7.1 Place the projector, fitted with a flexible cord or with a connector and a flexible cord, in any normal position on an inclined plane at an angle of 10° with the horizontal. Test a projector with a removable stand with and without the stand.

10.7.2 Place movable parts in the most unfavourable position. If alternative accessories are provided, use that which renders the projector most unstable.

10.7.3 Test a projector fitted with rollers, castors or feet by tilting through an angle of 10° when standing at horizontal surface.

10.7.4 The projector shall not overturn.

10.8 Test for Temperature-Rise — Continuous operation of the projector at rated voltage for a period of 8 hours with the specified wattage projection lamp in place, shall not produce a temperature in excess of the requirements given in 7.3, when measured at any external part of the projector except in the vicinity of the projection lamp. The rise in temperature above ambient shall be determined within tolerances of $\pm 2^\circ\text{C}$.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL		DEFINITION
Force	newton	N	1	$N = 1 \text{ kg.m/s}^2$
Energy	joule	J	1	$J = 1 \text{ N.m}$
Power	watt	W	1	$W = 1 \text{ J/s}$
Flux	weber	Wb	1	$Wb = 1 \text{ V.s}$
Flux density	tesla	T	1	$T = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	1	$Hz = 1 \text{ c/s (s}^{-1}\text{)}$
Electric conductance	siemens	S	1	$S = 1 \text{ A/V}$
Electromotive force	volt	V	1	$V = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	1	$Pa = 1 \text{ N m}^2$

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 3 31 01 31, 3 31 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices:

Telephone

*Western : Manakalaya, E9 MIDC, Marol, Andheri (East), 6 32 92 95
BOMBAY 400093

†Eastern : 1/14 C. I. T. Scheme VII M. V. I. P. Road, 36 24 99
Maniktola, CALCUTTA 700054

Northern : SCO 445-446, Sector 35-C, { 2 18 43
CHANDIGARH 160036 { 3 16 41

Southern : C. I. T. Campus, MADRAS 600113 { 41 24 42
{ 41 25 19
{ 41 29 16

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, { 2 63 48
AHMADABAD 380001 { 2 63 49

F Block, Unity Bldg, Narasimharaja Square, 22 48 05
BANGALORE 560002

Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, 6 67 16
BHOPAL 462003

Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002 5 36 27

53/5 Ward No. 29, R. G. Barua Road,
5th Bylane, GUWAHATI 781003 —

5-8-56C L. N. Gupta Marg (Nampally Station Road), 23 10 83
HYDERABAD 500001

R14 Yudhister Marg, C Scheme, JAIPUR 302005 { 6 34 71
{ 6 93 32

117/418B Sarvodaya Nagar, KANPUR 208005 { 21 68 76
{ 21 82 92

Patliputra Industrial Estate, PATNA 800013 6 23 05

Hantex Bldg (2nd Floor), Rly Station Road, 7 66 37
TRIVANDRUM 695001

Inspection Offices (With Sale Point):

Pushpanjali 205-A West High Court Road, 2 51 71
Bharampeth Extension, NAGPUR 440010

Institution of Engineers (India) Building, 1332 Shivaji Nagar, 5 24 35
PUNE 410005

*Sales Office in Bombay is at Novelty Chambers, Grant Road, 89 65 28
Bombay 400007

†Sales Office in Calcutta is at 5 Chowringhee Approach P. O. Princep 27 68 00
Street, Calcutta 700072